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6 May 1997

Mr. David Luzmoor
SOLVAY Minerals, Inc.
PO Box 1167
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Fx: 307-872-6510
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Subject: Burner NOX Emissions for Existing and Future Calciner / Dryer Applications

Dear Mr. Luzmoor,

The Solvay Green River plant site has (4) installations where our burners are presently used on either a Calciner or Dryer application. The Calciners (qty of 3) use our LEX series burner and the Dryer (qty of 1) uses our Flame Grid Burner. Also in addition to the existing burners, your future plans call to install one more Calciner with a LEX burner and one more dryer with a Flame Grid burner.

In the following I will address the Nox emissions expected from our burners in each of these cases and how the emission rate is typically corrected from a raw data to a industry standard emission level using 3% flue gas oxygen as a baseline. Though please remember that this formula is assuming that all the measured variables are from the products of combustion and does not account for any process attributed emissions or additional gases that might be developed by the process itself.

Both burner designs require them to be operated with excess air levels of between 55% and 65% for the best burner emission performance, under normal operation, though in some cases lower excess air or higher excess levels have yielded desirable performance from the burner and more favorable performance conditions from the process. These adjustments are based on whatever your needs might be for the process at that point in time.

EXISTING CALCINER BURNERS

The three existing calciners use the LEX burner, these being CA-1, CA-2, and CA-3, where CA-3 also has a heat exchanger which preheats the combustion air to about 270 deg F. The NOX emissions that can be expected from any of these three burners when operated per our control system recommendations and air/fuel ratio settings, the NOX will be less than 0.057#/MMBtu.

EXISTING DRYER BURNER

The one existing gas fired dryer uses the Flame Grid burner, this being DR-5. The NOX emissions that can be expected from this burner when operated per our control system recommendations and air/fuel ratio settings, the NOX will be less than 0.18 #/MMBtu.



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FUTURE CALCINER BURNERS

The future calciner will use the LEX burner, it will also have a heat exchanger which preheats the combustion air to about 270 deg F. The NOX emissions that can be expected from any of these three burners when operated per our control system recommendations and air/fuel ratio settings, the NOX will be less than 0.05 #/MMBtu.

FUTURE DRYER BURNER

The future gas fired dryer will use the Flame Grid burner, it will also have a heat exchanger which preheats the combustion air to about 200 deg F. The NOX emissions that can be expected from this burner when operated per our control system recommendations and air/fuel ratio settings, the NOX will be less than 0.15 #/MMBtu.

EMISSIONS BASELINE OXYGEN LEVEL

In general, the measured ppmv emissions from a burner only, when using natural gas as a fuel, can be corrected to a baseline emission standard of 3% oxygen (dry basis) in the flue gas (not to be confused with an operating flue gas oxygen level of between 6% to 10% measured in the stack), this is done to eliminate the effects of tramp infiltration air into the system. The 3% oxygen measured in the flue gas is a EPA standard (in the USA, not other countries) for most industrial fuel fired processes (excluding thermal oxidizers and gas turbines).

We use the following formula to convert the measured ppmv of NOX raw data into a equivalent NOX emission at 3% oxygen.

$$\text{PPMvd ref O2} = \frac{20.9\% - \text{O2 ref}}{20.9\% - \text{O2 act}} \times \text{PPMvd act O2}$$

In addition to the above formula, we will generally say that 83 ppmv @ 3% oxygen corrected is equal to 0.1 #/MMBtu.

For example, 0.05 #/MMBtu of NOX would then be equivalent to 41.5 ppmv @ 3% oxygen corrected. This not including any other process emissions which might add to or alter this procedure.

Please review this information and call me with any questions that you might have.

Best Regards


 James Kondziela
 Western Regional Manager